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Review of HIV Vulnerability and Condom Use in Central and Eastern Europe

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Abstract

The epidemiological trend of increasing HIV incidence rates due to sexual transmission in Central and Eastern Europe has been documented. The current review analyzed research articles that report on a wide spectrum of vulnerable populations from this world region. Studies of injection drug users, commercial sex workers, men who have sex with men, adolescents and young adults all reported inconsistent condom use. However, these patterns varied across populations and geographic areas. Populations in former Soviet countries—most affected by HIV—also often appeared to have lower condom use rates. Intensified, comprehensive, and locally-tailored measures to curb sexual HIV transmission are urgently needed. Social development programs need to incorporate HIV prevention.

Introduction

Central and Eastern Europe has seen sharp increases in HIV and sexually transmitted disease (STD) rates over the past two decades. While central and southern parts of the region were only modestly affected, former Soviet countries have seen a particularly dramatic rise in STD and HIV rates. HIV increases were first found among injection drug users (IDUs) and were primarily related to their needle sharing practices. However, the epidemic increasingly affects the general population, and sexual HIV transmission—although not yet the predominant mode—already accounts for 42% of all new HIV cases in these countries.[1]

Epidemiology of HIV/AIDS and STDs in Central and Eastern Europe

The region has seen overall increases in HIV and STD rates in the past two decades. Rises in STDs were particularly sharp in several post-Soviet states, including Russia, Ukraine, Belarus, Moldova, and Kazakhstan.[2] For example, the rate of syphilis soared from 4 cases per 100,000 recorded in the mid-1980s to 263 per 100,000 by the mid-1990s, a roughly 62-

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Conflicts of Interest

None declared

fold increase.[3] Similar increases were found with respect to gonorrhea, Chlamydia, and trichomonas.[4,5] STD rates in these countries recently retreated from their historic highs, but STDs remain extremely prevalent. STD rate increases in other post-Soviet countries were less pronounced[2] while the region's central and southern parts—with the exception of Romania—have lower STD prevalence.[6]

UNAIDS estimated that the total number of HIV cases in the region was 1.4 million in 2009.[7] The sharpest increases were observed in some former Soviet states including Ukraine, which has adult HIV prevalence of 1.1%, the greatest in Europe. Although still concentrated, HIV prevalence in Ukraine, together with Russia and Estonia, all exceed the WHO threshold for designating a generalized epidemic, and the quick rise in the number of newly-diagnosed sexually-transmitted HIV infections is alarming. 3.7 million persons in the region are estimated to be injection drug users (IDUs).[7] Approximately 25% are infected with HIV, and HIV prevalence among IDUs in Russia and Ukraine varies between 37% and 50.3%.[1] However, heterosexual HIV transmission is on the rise, with sexual partners of IDUs being most affected. Increases in heterosexual transmission are also partially attributable to overlap between IDU and commercial sex worker (CSW) populations who may transmit HIV to their clients.

Men who have sex with men (MSM) have been especially affected by HIV in central and south-eastern parts of the region, although prevalence rates vary highly throughout the region. Surveillance studies suggest that HIV rates among MSM range from below 5% in Russia, Albania, Croatia, Georgia, and Estonia. Exceptionally high HIV rates have been found among MSM in some Ukrainian cities such as 8% in Kryviy Rig, 10% in Mykolayiv, and 23% in Odessa.[8] However, the extent to which these findings represent MSM communities in the respective countries is unclear due to differences in sampling methodologies and potential limitations that may result in the underrepresentation of persons who may be at particularly high risk, as well and those who do not visit gay-identified venues. Other populations of particular concern are prisoners, impoverished ethnic minority groups, and labor migrants.

From a demographic perspective, adolescents and young adults remain especially vulnerable across the region. For example, the greatest increase in STD rates in Russia—a 90-fold rise from the mid-1980s—occurred among teenagers.[3] HIV risk among females is due to a number of factors that vary across subregions include trafficking, limited power to control the use of condoms, partner violence or pressure, and prevailing social norms intolerant of the exercise of sexual freedoms by females.[9,10]

Transitions and Barriers to HIV Prevention

Central and Eastern Europe has seen rapid but often uneasy transformations from communist systems to democracy and free market economies. These transformations affected social, political, and economic systems. However, the pace of reforms has been uneven. While most Central European countries have effectively implemented economic reforms, other countries—particularly those that were part of the former Soviet Union—have faced much greater obstacles. Social hardships—such as high rates of unemployment, poverty, social instability, and fatalism—still characterize this subregion. These are also

factors that are globally associated with dramatically increased levels of commercial sex work, with illicit substance use and abuse, and consequently with high rates of STDs and HIV. Another enabling factor was generally increased tolerance of behaviors that were socially forbidden in the Soviet-era past such as commercial or casual sex and drug use.

Some Central and Eastern European countries quickly introduced and implemented public health programs including needle exchange, sex education, and condom promotion. In contrast, effective measures of HIV prevention were not implemented in the timely manner in most post-Soviet countries which still lack funding, infrastructure, trust within vulnerable community populations, and political support. As a result, HIV epidemic trajectories in these subregions also differed. While HIV epidemics in countries outside of the former Soviet Union have often been well managed—and disease incidence and prevalence has increased only modestly—large-scale and rapid HIV raises have occurred in many former Soviet countries.[11]

Large increases in STD and HIV rates in the mid- to late-1990s showed that post-Soviet public health systems were poorly prepared to mitigate the consequences of these epidemics. STD treatment was historically provided by the state. However, the reach of these services was ineffective and was certainly inadequate to cope with large rises in STDs and HIV. Prevention programs for at-risk populations were almost nonexistent, and the scope of public health prevention activities still remains very limited, especially in many post-Soviet republics. This was also partly due to a lack of mobilization of affected communities to confront HIV epidemics, limited community infrastructure and community representation in public health decision-making, and little experience and awareness of effective prevention measures. Even now, 89% of the subregion's HIV prevention funding is not directed to vulnerable community populations who are most affected by the disease.[7] In addition, educational systems often were not ready to implement sex education. For example, Russia —the country that has seen the greatest rates of both STDs and HIV—still prohibits school programs that provide education about personal protection against HIV and STDs.[12] As a result, access to reliable information about protection related to sex or drug injection remains limited.

AIDS prevention NGOs in Central and Eastern Europe often function under difficult circumstances. A region-wide NGO survey found that the most frequently-cited barriers to effective functioning and serving their communities are lack of funding, governmental indifference or opposition, AIDS-related stigma, low HIV risk perception by communities, and the presence of other pressing severe social problems such as war and poverty that make concerns about HIV and STDs less salient than everyday social hardships.[13] In general, AIDS service providers had only limited capacity and resources to carry out HIV prevention programs on a wide scale to vulnerable populations in their communities. However, recent stories successful practices and developments are encouraging.[14] Under the aegis of Global Fund to Fight AIDS, Tuberculosis, and Malaria, NGOs in several countries—such as Ukraine, Georgia, and Kyrgyzstan—substantially increased the scope and coverage of HIV prevention activities.

Condom use is an important indicator of the effectiveness of existing HIV prevention education, policies, and measures. The aim of this article is to review what is known about condom use levels and the prevalence of sexual risk practices in a variety of populations in Central and Eastern Europe.

Data Resources for the Current Review

In order to collect data for this review, U.S. National Library of Medicine and National Institutes of Health electronic bibliographic resources[15] were utilized and searched for all possible peer-reviewed article citations related to HIV/AIDS risk behavior research in post-communist countries in Central and Eastern Europe and Central Asia. All articles published between 2000 and 2010 (total=380) were screened for a topical relevance, namely any reference to condom use in either their measures or the results descriptions in paper abstracts. Potentially relevant articles (a total=129) were then further screened for inclusion of specific behavioral data of interest, namely condom use in any population group within the region. Fifty-six articles resulted from this screening and were classified by study target population group. Table 1 lists these articles and describes the sampling frames of each study. All but three articles were published in English. Adolescents and young adults were most frequently studied (n=18), followed by injection drug users (IDU, n=10), men who have sex with men (MSM, n=10), commercial sex workers (CSW, n=8), people living with HIV (PLH, n=4), the Roma ethnic minority group (n=3), prisoners (n=2), and labor migrants (n=2). If multiple papers reported results from a single dataset, they were counted as a single paper. About one-third of all studies (n=18) included in the review were based on research in Russia and much smaller proportions represented other countries. For nine countries, no results were found as an outcome of this search. In addition, the search identified regional HIV risk behavioral research review articles that were not directly used as data sources, although their findings were selectively used to support conclusions that resulted from the current research.

Condom Use among At-Risk Populations

Adolescents and Young Adults

Heterosexual transmission now accounts as much as 40% to 50% of all new HIV infections in Russia and other countries in which IDUs were primarily affected in the late-1990s and early-2000s.[1] A large cross-European review study revealed that, by the age of 15, from 19% of adolescents in Estonia to 47% in Ukraine had sexual intercourse.[16] Even though condoms were reported to be the most common type of sexual protection, they were used at last intercourse from 59% of the time by adolescents in Ukraine to 76% in Macedonia.[16] A Croatian study among youth between the ages 18 and 24 found that 41% of last intercourse events reported by men and 54% reported by women were unprotected.[17,18] An alarmingly low rate of condom use at last intercourse act was reported from Poland, where only between 11% and 27% of adolescents said that they used any kind of contraception.[19,20]

Rates of consistent condom use in adolescents and young adults were also low. Research findings showed that consistent condom use ranged from 7% in the Russian province city of Kostroma[21] to 29% in St. Petersburg,[22] 40% in Budapest, Hungary,[23] and 44% in Moscow,

Russia.[24] Oral contraceptives were also commonly used in the region,[16,25] indicating that a large proportion of young people view sexual protection as prevention against pregnancy rather than a measure to prevent HIV or STDs.[26] A study among Croatian school adolescents surveyed in 1997 and 2001 revealed increases in condom use and consistency, particularly among females, although 40% still did not use condoms at last intercourse in the later sample.[27] A similar pattern of more frequently engaging in sex but also more often using condoms between the 1990s and 2000s was observed among school adolescents in Slovenia.[25,28] There are certain geographic differences with respect to gender and engaging in sexual risk behavior. For example, in the Republic of Georgia, 40% of 14- to 17-year old males—and only 3% of females of the same age—were reported to be sexually experienced.[29] This pattern is likely to broadly characterize subregions such as the Trans-Caucasus, Central Asia, and also certain ethnic groups in Central Europe—such as Roma[30]—with traditions strongly prohibiting females from pre-marital sexual engagements. In contrast, over half of 17-year old Slovenian adolescents were sexually experienced.[25] Some studies found that the proportion of male youth paying for sex was as high as 30% in Kazakhstan.[31] Qualitative research conducted in Hungary and Russia suggests that condom use declines quickly following first sex with a new partner, and that reintroducing condom use in a relationship is difficult.[26]

Street adolescents—including those orphaned, homeless, abandoned by their families, or those who left their homes for other reasons—are particularly vulnerable to HIV and STDs. For example, only 20% of Russian street adolescents reported that they consistently used condoms, and extremely high proportions of participants in these samples were HIV-positive.[32,33] Consistent with these findings, homelessness predicted HIV-positive serostatus among young injector drug users.[34] Unlike in other “at risk” populations, heterosexual HIV transmission often occurs in stable, regular relationships in which persons are often not aware of their partner’s risk behavior engagement and—therefore—do not perceive themselves as vulnerable.

Injection Drug Users

IDUs are among the community populations most affected by HIV/AIDS, particularly in former Soviet republics. HIV prevalence rates among IDUs are as high as 45% in Estonia and Russia.[34,35] In these circumstances, condom use is the most important tool to prevent sexual transmission from IDUs to their sexual partners. Thus, drug users are not only affected by HIV due to their own needle use risk practices, but also constitute a bridge to the non-IDU majority population in the former Soviet Union. Sharing needles and also engaging in unprotected sex are common among IDUs in this region, particularly in Russia.[34,36–38] Several studies among IDUs have been conducted in St Petersburg. One found that 41% of IDUs shared needles, 70% had recently engaged in unprotected vaginal intercourse, and most had multiple sex partners in the past 3 months.[38] Another study showed similar risk levels and also found that 44% of drug users engaged in sex with non-IDU partners.[36] Finally, a dyad-level study found that most HIV-serodiscordant couples of IDUs continued to have unprotected sex.[37] There has been no consistent pattern of findings related to the association between HIV positive status and condom use. For example, studies have found a negative association between HIV infection and condom use among IDUs in Uzbekistan,[39] a

positive association in Ukraine,[40] and no association in an Estonian IDU sample.[35] This is probably because transmission risk related to sharing needles overrides risk for contracting HIV during sex among current drug injectors. In contrast, younger age has been consistently found to predict HIV-positive serostatus among IDUs across these studies. Overall, the issue of unprotected sex and condom use among drug users in post-Soviet countries has been much less frequently studied than IDU injection risk practices. This constitutes a significant gap in public health knowledge given the high proportion of HIV infections attributable to sexual transmission from HIV-infected IDUs to their sexual partners.

Although much lower HIV prevalence has been reported among IDUs in countries outside of the former Soviet Union, such as 0.2% in Czech Republic[41,42] and 0.5% in Bulgaria,[43] unprotected sex among drug users was common. This is an alarming indicator of the potential for HIV transmission from IDUs to their sexual partners and beyond.

Commercial Sex Workers

The vulnerability of commercial sex workers has been well-documented in a large number of studies. Injection drug use in Eastern Europe is intertwined with commercial sex work since selling sex is often a source of money used to pay for drugs when other sources are limited. Drug injection was reported by 8% of CSWs in Estonia,[44] 10% in Latvia,[45] 15% in Serbia,[46] and 25% in Lithuania.[47] In addition, a history of engaging in commercial sex was reported by 37% of female IDUs in a sample in St. Petersburg, Russia.[48]

A general pattern of great HIV vulnerability has emerged from studies of CSWs in Central and Eastern Europe. Inconsistent condom use by sex workers has been commonly reported across studies.[45–47,49–51] Higher STD and HIV rates and more frequent unprotected sex particularly characterize street-based CSWs, while indoor-based CSWs are often more knowledgeable and use condoms more consistently. Street CSWs in Turkmenistan reported use of condoms primarily when condom use was initiated by the client, and bar-based CSWs regularly use condoms only with first-time clients.[50] However, their perception of HIV vulnerability was low. In contrast, a Serbian study[46] found greater risk knowledge and risk perception among indoor-based CSWs but low levels of HIV awareness—and low condom use—among street-based CSWs. In addition, engaging in street-based sex work was a significant predictor of HIV-positive serostatus in a Uzbekistani study of CSWs.[51] In samples of CSWs in Latvia and Lithuania, the prevalence of biologically-tested STDs was extremely high,[45,47] and one-fifth the Latvian study participants were pregnant. Economic hardship, unemployment, and poor living conditions were main reasons of engaging in commercial sex among CSWs in Latvia.[45] Similar findings were reported from a Lithuanian sample. Alarmingly, a large proportion in the Lithuanian sample were trafficked women who had engaged in commercial sex for over 10 years.[47]

Taking into account high HIV prevalence rates among CSWs in former Soviet countries, their clients and other sexual partners are also vulnerable. However, little research among the latter groups has been reported to date.

Men Who Have Sex with Men

HIV risk among Central and Eastern European MSM has not received adequate research attention. Condom use during anal intercourse is a primary indicator of risk level among MSM. This is because anal intercourse poses the greatest biological risk for HIV transmission from an infected to the uninfected partner, and also because the behavior is widely practiced by MSM. In this respect, a number of risk behavior patterns have emerged from the literature.

Although HIV risk knowledge and awareness are generally high among Central and Eastern European MSM, these are not directly translated to safer behaviors. A number of barriers need to be addressed to facilitate the adoption of safer behavior strategies. Among the most prominent barriers in the region are MSM-related stigma and discrimination, as these produce circumstances that make it difficult to sustain sexual safety.[52] High rates of unprotected intercourse have been reported in various studies throughout the region, and MSM account for a majority of infections in the region's Central and Southern countries.[53] Only 43% of a Russian—and a half of a Hungarian—sample of MSM reported using condoms consistently in the past 3 months.[54,55] Two-thirds of men in social network samples of Hungarian and Russian MSM reported that they recently engaged in unprotected sex.[56] Rates of condom use at last intercourse reported among various MSM samples include Russia (63%),[54] Estonia (59%),[57] Hungary and Russia MSM networks (56%),[56] and Slovakia (29%).[58] However, these studies were conducted at different time points and do not show the dynamics of condom use over time. The only condom use dynamic estimates were reported in a sentinel surveillance study in Slovenia, where condom use at last intercourse declined from 81% in 2004 to 66% in 2008,[59] indicating an alarming need for additional HIV prevention efforts.

Decisions by MSM about whether condoms are to be used often depend on partner type. Greater levels of condom use are usually reported during sex with casual partners and much lower condom use with "regular" partners.[58] In a Hungarian sample, being in a steady relationship was associated with lower condom use rates.[55] Participants in a Hungarian-Russian social network study indicated that 55% of their last anal intercourse was practiced with a casual partner.[56] 81% of MSM in a Croatian sample said that their most recent anal intercourse with a casual partner was protected, but only 56% reported consistently using condoms with casual partners in the past year.[60]

Other risk factors among MSM in the region include having multiple sex partners within a short timeframe.[56] For example, 53% of participants in a Russian MSM sample—and 25% of men in a Hungarian sample—had sex with multiple partners in the past 3 months.[55] This reflects frequent concurrent or short-term serial relationships. For example, Russian MSM reported that their median length of a sexual relationship was 10 months, but one-third of men in primary relationships had outside male partners and almost half had outside female partners in the past 3 months.[54] Another risk factor of HIV risk among MSM in the region was engaging in commercial sex. For example, 23% of MSM in Russia reported that they sold sex, and 45% of them had recent unprotected anal intercourse.[54,61] However, the representativeness of these findings is unknown because there has been little research on commercial sex engagement among MSM in this world region.

Bisexual behavior—a potential bridge to a heterosexual virus transmission—has been commonly reported among MSM in the region, and the use of condoms among bisexual men is also inconsistent. Both bisexual identity and behavior were commonly reported by MSM. In Estonia, half of an MSM sample reported being bisexual.[57] In a Russian sample, 29% of MSM had sex with partners of both genders in the past 3 months. In Hungary, 26% of MSM had female—in addition to their male—partners in the past year, and used condoms only 23% of the time with them.[55] A similar level of recent bisexual behavior was reported in a Russian sample.[54,62] In Croatia, only about 20% of behaviorally bisexual men used condoms consistently.[63]

Finally, substance use has been commonly reported by MSM, often including illicit drugs.[54,56,57] Use of recreational drugs was greatly associated with engaging in unprotected sex.[56] This was not found among Croatian MSM,[63] although very low response rate may have influenced sample validity.

Other Impoverished Community Populations

Several other populations have been reported to be behaviorally vulnerable to HIV. For example, incarcerated persons are at elevated risk due to injecting drugs, engaging in unprotected sexual practices and sex in exchange for money or valuables, as well as using non-sterile methods of tattoo engraving and piercing.[64–66] Correctional facilities often lack provisions—and fail to provide—clean needles and condoms. As the result, in countries such as Ukraine, HIV prevalence among prisoners became as high as 32%.[64] The scale-up of prevention programs in correctional facilities, as well as HIV care provision, are needed in much of the region.

Public health concerns associated with labor migration have been documented worldwide. Russia is Central and Eastern Europe's leading—and is the entire world's second leading—destination country for international labor migrants. Migrants' risk is often related to their prolonged stays apart from their spouses and engaging in sex with casual partners, often with commercial sex workers.[67,68] Croatian migrants—seafarers and construction workers—reported multiple sex partners in the past year, and 45% of migrants said that their last intercourse with casual partners was unprotected.[67] In a Russian study of labor migrants from former Soviet republics of Central Asia and Eastern Europe, one-third reported multiple sex partners in the past three months.[68] Condom use rates were as low as 52% with casual—and 35% with permanent—sexual partners. Although limited scope of research does not allow one to identify the extent of representativeness of these findings, they indicate that labor migrants should be reached by STD/HIV intervention programs.

Roma (Gypsy) constitute the largest ethnic minority population in Central and Eastern Europe. Although Roma have not been widely affected by HIV to date, many social factors and risk behavioral data indicate their potentially high HIV vulnerability. Studies among Bulgarian Roma men found very high rates of high-risk behaviors.[69,70] Most men in a Roma community settlement sample in Sofia, Bulgaria had multiple sexual partners in the past 3 months and 77% did not use condoms during their most recent vaginal intercourse.[70] Almost three-quarters of men in this study practiced anal sex with females, and only one in four of these acts were protected. Over one-quarter of Roma men in the sample reported engaging in

sex with men at some point in addition to their heterosexual behavior, and 10% did so in the past three months. Finally, 16% of Roma men sold—and 32% paid for—sex in the past three months. Distinct aspects of Roma HIV vulnerability are associated with gender roles and expectations.[30] As such, Roma men have great sexual freedom before and during marriage, and exercise relationship power and control. Roma women are expected to maintain virginity before marriage and then sexual exclusivity to their husbands. Gender power dynamics need to be taken into account in condom promotion and risk prevention programs among Roma.

People Living with HIV (PLH)

A limited body of research on condom use among PLH has been reported to date from the Central and Eastern European region. Only three studies—one from Zagreb, Croatia[71] and three from St. Petersburg, Russia[72–74]—have systematically recruited cross-sectional PLH samples from AIDS service provider settings. With respect to transmission risk behaviors, 20% of Croatian HIV-positive MSM reported unprotected intercourse with seronegative or status-unknown partners in the past 6 months, and half of them reported unprotected intercourse with multiple casual partners of unknown status. Heterosexual PLH in the sample commonly reported unprotected sex with their regular partners. Only half of participants in an HIV-positive IDU sample from Russia used condoms at their last intercourse regardless of their partners' serostatus.[74] Two other Russian survey studies among PLH, one conducted in 2002[72] and another in 2009,[73] found high rates of unprotected sex by persons aware of their positive HIV status. Most PLH had sexual partners of seronegative or unknown status, with a mean of 5.8 partners.[72] In both studies, about a half of participants in the samples reported engaging in some unprotected intercourse, and a mean of 30% of intercourse acts were unprotected. The subsample which reported the greatest level of sexual transmission risk behavior were HIV-positive IDUs who are also MSM, and the lowest level was reported by PLH who reported heterosexual HIV exposure.

Discussion

International calls for preventive action long emphasized the need for urgent measures—such as needle exchange and methadone treatment roll out programs—to curb the HIV epidemic among IDUs. While such measures were quickly introduced in some countries, others—primarily post-Soviet countries—delayed the initiation of funding and necessary policies. HIV prevention programs often lacked political support, were conducted on a limited scale, or simply did not exist. Barriers to effective HIV prevention programs vary across the region. However, they often include lack of infrastructure dedicated for HIV prevention; political or religious opposition that often considers condom promotion or needle exchange as immoral; continued high stigmatization of vulnerable groups that makes them hard to reach by community programs; and insufficient coverage of existing prevention programs. NGO funding in most countries is scarce and unstable, often relying on international donor agencies rather than national governments.[13]

Initially fueled by unsafe drug injection practices in post-Soviet countries, HIV/AIDS growth is now becoming increasingly driven by sexual HIV transmission. In other parts of Central and Eastern Europe, HIV remains primarily characterized by sexual transmission. The findings reviewed here show that IDUs often engage in unprotected sex, which illustrates that sexual partners of drug injectors are at substantial risk. Since IDUs also often sell sex to buy drugs, clients of CSWs are also are at high risk and constitute a bridge group to the general population. For these reasons, heterosexual risk exposure in Central and Eastern Europe has expanded beyond those who themselves engage in commercial sex or inject drugs. Although the epidemic remains concentrated, HIV prevalence rates in Russia and Ukraine already exceed one percent of the general population.

The current review identified population groups—and also geographic areas—that require the scaling up of condom promotion programs and expansion of their coverage to reduce the incidence of HIV and other STDs. Of a particular concern, the lowest rates of condom use were found among the most socially disadvantaged, low-income population groups which suggests that, to be effective, HIV prevention programs need to be embedded in broader social development programs so to address basic needs of the target population groups.

In many Western countries, MSM account for the greatest proportion of HIV infections. HIV prevalence among MSM in Central and Eastern Europe has not reached the very high prevalence levels typical of the West. However, findings identified in this paper—taken together—suggest that MSM in Central and Eastern Europe are in continuous need of high-impact prevention interventions. Programs to promote condom use among MSM need to scale up and to engage communities into this endeavor.

HAART rollout has reduced HIV-related mortality rates and increased life quality and expectancy among infected persons. However, longer lives, better health, and continued sexual behavior of HIV-infected individuals underscore the need for secondary prevention programs for them to reduce transmission to others. High levels of HIV risk transmission behaviors were found among PLH. Programs that address life, mental health, and social development needs of PLH must be developed and implemented throughout the region. Conclusions resulting from the review of available literature call for immediate action:

- Condom promotion programs need to scale up to levels that reach vulnerable population groups including those hard to access by conventional counceling methods.
- Implementation of programs to promote safer behaviors to curb HIV in communities integrated with programs that address social and community development, poverty, social disadvantage, discrimination, human rights, and social inequality.
- Developing infrastructure—and allocating appropriate financial resources—needed to provide effective and affordable public health services to prevent and treat HIV and STDs, with a particular focus on specific health issues of women, of MSM, and other vulnerable groups.

- Scaling up research to further study HIV prevention needs of vulnerable populations and to develop and implement effective risk reduction programs.
- Advocating for political and public support to overcome existing—and protect against future—obstacles to successful HIV prevention.

Several limitations of this literature review must be noted. The analysis of data from the reviewed articles was not formally performed as a meta-analysis. This paper included the review only of peer-reviewed articles and did not include data that was published in forms such as non-peer-reviewed conference abstracts, public reports, and presentations. Some articles were not included into review if they did not provide sufficient details or if it was not possible to interpret presented data. Further research is needed to address these gaps. Other limitations were not under the control of the author. For example, the body of the identified literature lacked findings from several countries and—therefore—needs of their vulnerable populations were underreported in the literature. The studies reviewed reflect self-reported data that often is subject to bias typical for the sexual behavior survey studies. In addition, behavioral levels were assessed at different time points and may not necessarily reflect the current picture. Finally, some of the articles lacked sufficient description of the sampling methods, and a substantial proportion of studies relied on convenience or small samples. Findings from these studies should be interpreted with caution since their generalizability is unclear.

Central and Eastern Europe—which has experienced many political, economic, and cultural transitions over the past two decades—is in a position to implement a large variety of effective measures to reduce HIV incidence. Comprehensive approaches have already been successfully implemented in some countries of the region, but still remain needed in others. Political will is needed to overcome policies that presently constrain effective HIV prevention approaches, limit opportunities for public education, and produce stigma.

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Table 1

Roster of Studies Included in the Review

Country in which Data Was Collected	References	Sampling Frame	n	Remarks
Adolescents and Young Adults				
Region-wide	Godeau et al.[16]	Cross-national, cross-sectional school probability sample	33,943	Age: 15. Only data from Central and Eastern European region was used.
Croatia	Stulhofer et al.[17], Bozicević et al.[18]	National, multi-stage stratified probability household sample	1,093	Age: 18–24.
Poland	Woynarowska et al.[19]	Cross-sectional school representative sample	2,893	Age: 16–18.
Poland	Woynarowska et al.[20]	Cross-sectional school representative sample	2,152	Age: 15–16. Subset of data collected in 2002.
Russia	Shorokhov et al.[21]	1st and 2nd grade university student convenience sample	100	Age: not specified.
Russia	Amirkhanian et al.[22]	Cross-sectional school representative sample		Age: 15–17.
Hungary	Gyarmathy et al.[23]	Cross-sectional school representative sample	3,486	Age: not specified, secondary school students.
Russia	Bobrova et al.[24]	Random telephone sample	1,203	Age: 15–29.
Slovenia	Pinter et al.[25]	Cross-sectional school representative sample	1,095	Age: 16–18.
Hungary, Russia	Takacs et al.[26]	time-location sampling to access “seeds” and their egocentric networks	66/	Age: 19–21. In-depth interviews. Sample includes 12 egocentric networks.
Croatia	Hirsl-Hećej & Stulhofer[27]	Cross-sectional school representative sample	4,000	Age: 15–19.
Slovenia	Pinter & Tomori[28]	National, cross-sectional school representative sample	4,706	Age: 15–19.
Georgia	Goodwin et al.[29]	Three-stage stratified probability sample	2,880	Age: 14–17.
Bulgaria, Hungary	Kelly et al.[30]	In-depth interviews, time-location representative sample	42	Age: 18–42. Study was conducted in Roma community.
Kazakhstan	Hansson et al.[31]	Cross-sectional school and university representative sample	600	Age: not specified, subsample medians varied from 17 to 20.
Ukraine	Busza et al.[32]	Cross-sectional targeted and time-space convenience sample	805	Age: 10–19. Study was conducted among street adolescents.
Russia	Kissin et al.[33]	Cross-sectional targeted and time-space representative sample	313	Age: 15–19. Study was conducted among street adolescents.
Injection Drug Users				
Russia	Niccolai et al.[34]	Respondent-driven sample	631	Sample includes both IDUs and non-injection drug users.
Estonia	Wilson et al.[35]	Time-location cross-sectional sample	266	
Russia	Abdala et al.[36]	Convenience sample	159	
Russia	Gyarmathy et al.[37]	Combined time-location and chain-referral sample	661	IDU dyads.
Russia	Somlai et al.[38]	Time-location representative sample	446	

Country in which Data Was Collected	References	Sampling Frame	n	Remarks
Uzbekistan	Todd et al.[39]	Cross-sectional sample	701	
Ukraine	Booth et al.[40]	Time-location representative sample	900	
Czech Republic	Bruchkova et al.[41]	Time-location cross-sectional representative sample	462	IDU subset only.
Czech Republic	Mikl et al.[42]	Time-location cross-sectional representative sample	599	
Bulgaria	Vassilev et al.[43]	Cross-sectional targeted and time-location sample	773	
Female Commercial Sex Workers				
Estonia	Uusküla et al.[44]	Combined time-location and respondent-driven sample		
Latvia	Kurova et al.[45]	Cross-sectional street and club sample	107	In-depth interviews and lab STI/HIV tests.
Serbia	Ilić et al.[46]	Cross-sectional street and club sample	191	
Lithuania	Chaplinskas & Mårdh[47]	Cross-sectional street and club sample	73	
Russia	Benotsch et al.[48]	Data subset of Somlai et al [31] study	100	Subset includes IDUs engaged in commercial sex.
Armenia	Markosyan et al.[49]	Convenience sample, 3 cities	98	
Turkmenistan	Chariyeva et al.[50]	Cross-sectional street and club sample	8	
Uzbekistan	Todd et al.[51]	Combined, cross-sectional time-location and snowball convenience sample	448	
Men Who Have Sex with Men				
Russia	Amirkhanian et al.[54]	Time-location representative sample	434	
Hungary	Csepe et al.[55]	Time-location representative sample	469	
Russia, Hungary	Amirkhanian et al.[56]	Time-location sampling to access “seeds” and their sociocentric networks	156	Sample includes 4 sociocentric networks.
Estonia	Tripathi et al.[57]	Cross-sectional convenience sample	79	
Slovakia	Staneková et al.[58]	Time-location sample	119	
Slovenia	Klavs et al.[59]	Venue-based convenience samples	Range: 68–124	2001–2008 sentinel surveillance study.
Croatia	Štulhofer et al.[60]	Snowball	342	HIV-negative MSM only.
Russia	Kelly et al.[61]	Data subset of Amirkhanian et al [47] study	96	Subset includes MSM engaged in commercial sex.
Russia	Kelly et al.[62]	Data subset of Amirkhanian et al [47] study	126	Subset includes MSM with female sex partners.
Croatia	Kolarić et al.[63]	Combined venue and internet-based convenience sample	1,127	
Prisoners				
Hungary	Gyarmathy et al.[65]	Convenience sample	632	
Slovakia	Staneková et al.[66]	Convenience sample derived from HIV discussion group participants	75	
Labor Migrants				
Croatia	Stulhofer et al.[67]	Time-location representative sample	566	Participants were recruited at medical examination clinics.

Country in which Data Was Collected	References	Sampling Frame	n	Remarks
Russia	Amirkhanian et al.[68]	Time-location representative sample	499	Participants were recruited at medical examination clinics.
Roma (Gypsies)				
Bulgaria	Kabakchieva et al.[69]	Time-location sampling to access “seeds” and their egocentric networks	296	Males only.
Bulgaria	Kabakchieva et al.[70]	Time-location representative sample	324	Males only.
Bulgaria	Kelly et al.[30]	Time-location representative sample	42	In-depth interviews.
People Living with HIV				
Croatia	Zekan et al.[71]	Time-location representative sample	185	
Russia	Amirkhanian et al.[72]	Time-location representative sample	470	
Russia	Amirkhanian et al.[73]	Time-location representative sample	492	
Russia	Grau et al.[74]	Respondent-driven sample	157	HIV-positive IDUs only.